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What is the True Cost of Linpack?

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Assumptions

- Leadership class system:
 - Cost: \$200M
 - Lifetime: 4 years
 - Power consumption: 10MW
- Cost of one MW-year is \$1M
- Linpack measurement requires system for a week
 - To achieve a high fraction of peak requires a large problem size so a typical MP Linpack run takes a day
 - Multiple runs are made as initial tests are run with “small” problems
 - Successive tests use larger and larger problem sizes, some of these tests will “fail” – requiring re-runs

Cost Estimates

- Electricity Cost
 - One week of usage $\approx [1/50 \text{ year}] \times 10\text{MW} = 0.20 \text{ MW-year} = \0.2M
- Amortized CapEx Cost
 - Opportunity cost associated with one week of usage
 - One week of dedicated system time is 1/200th of the life of the machine
 - That week represents 1/200 of the cost of the system or \$1M
 - The cost for one week of time on a new system is $> \$1\text{M}$
- Staff Cost
 - One week of how many peoples' loaded salaries?
 - How many are working around the clock?
 - Pizzas, Fried Chicken, Breakfast Burritos, **Beer**, Ice Cream, etc.

The True Cost of Linpack

- The fact that MP Linpack has been the Primary Metric for the Supercomputing community has another cost
 - Because leadership class system architects are motivated by the Top500 list, HPC systems have suffered from distorted priorities that skew system balance
 - The resulting poor fraction of peak performance for our mission applications is an element of the true cost of Linpack
 - This cost: Priceless
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